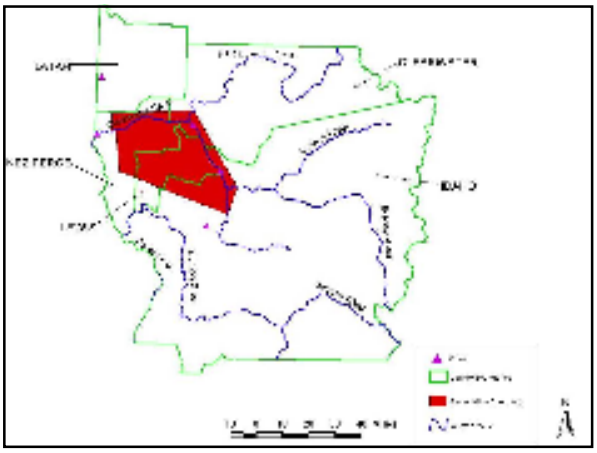
IAQ Efforts on the Nez Perce Reservation

Johna Boulafentis
Environmental Outreach Specialist
ERWM Air Quality
Nez Perce Tribe

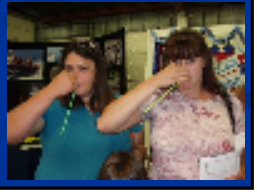
Overview

- Nez Perce Reservation
- General IAQ Outreach and Education
- IAQ Assessments of Nez Perce Tribal Administrative Buildings
- Woodstove Study and Changeout
- Air Toxics and Health on the Nez Perce Reservation



General IAQ Outreach and Education

- Community events
- Presentations
- Newspaper articles



IAQ Assessments

- 49 assessments (including reassessments)
  - 37 buildings (29 in 2005, 5 in 2006, 3 in 2008)
- Sampled for CO_2 and PM
  - Some buildings for temperature, RH, moisture levels, and pressure
- Building Considerations
  - Type/Design, Age, and Condition
- Common Problem Areas
  - HVAC/thermostats, gutters, crawlspace
  - Older buildings: carpet, lead, asbestos, water leaks, attics

Challenges

- Communication & Information Sharing
- Staff and Funding
- NPT Maintenance concerns

Outcomes/Successes

- Capacity building
- IAQ awareness in the workplace
- Building assessments
- Reference resource of IAQ reports
- Remediation loan in 2005
- Overall maintenance changes
- Building improvements

Building Improvements

Building 1

Building 2

Woodstove Study & Changeout

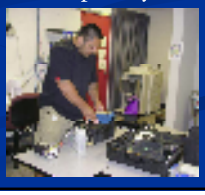
- 16 participating households
  - Used old woodstove as primary source of heat
  - Non-smoking, tribal member homes in Kamiah and Lapwai
  - Asthmatic child between ages of 6 and 17
- Sampling before/after changeout
  - Ambient $PM_{2.5}$ mass
  - Indoor $PM_{2.5}$ levels and chemical markers of woodsmoke
- Woodstove changeout
- Outreach and education

Ambient Monitoring

- Utilized existing network
  - PM2.5 TEOM
  - Met Site: temperature, RH, precipitation, wind speed
- EPA $PM_{2.5}$ standards
  - 24/hr is 35 $\mu g/m^3$
  - Annual is 15 $\mu g/m^3$

Indoor Sampling

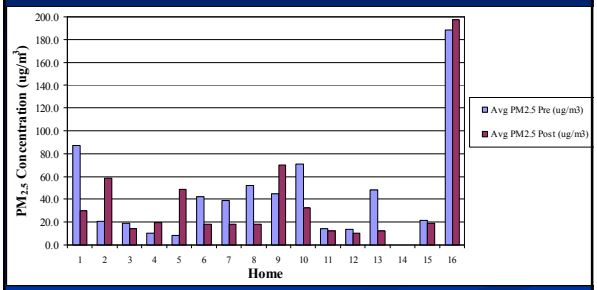
- Equipment
  - DustTrak (Model 8520)
  - Leland Sampler / Personal Environmental Monitor (PEM) with a quartz filter
- Sampled for 24-hour period,1 to 5 sample days
- Intern sampling duties
- Participant responsibilities



Indoor Sampling Equipment

From Old to New

Indoor $PM_{2.5}$ Mass Comparisons



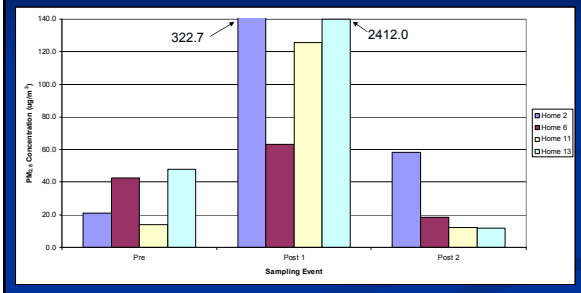
PM2.5 and OC/EC/TC
(Homes with Complete Datasets)

	Median $PM_{2.5}$ ($\mu g/m^3$)	Minimum $PM_{2.5}$ ($\mu g/m^3$)	Maximum $PM_{2.5}$ ($\mu g/m^3$)	OC ($\mu g/m^3$)	EC ($\mu g/m^3$)	TC ($\mu g/m^3$)
Pre Changeout	21.6±57.5	5.0±6.6	254.0±731.1	16.9±15.3	0.3±0.4	17.2±15.5
Post Changeout	18.4±54.1	4.0±13.4	145.0±278.3	13.4±11.0	0.7±0.4	14.0±11.3
Difference	-15%	-20%	-43%	-21%	+120%	-19%

Chemical Markers of Woodsmoke
(Homes with Complete Datasets)

	Levoglucosan (ng/m^3)	Dehydroabietic acid (ng/m^3)	Abietic acid (ng/m^3)	Vanillin (ng/m^3)	Acetovanillone (ng/m^3)	Guaiacol (ng/m^3)	4-Ethylguaiacol (ng/m^3)
Pre Changeout	645.1±1315.3	113.0±147.7	11.3±118.7	0.5±2.3	0.3±9.2	0.9±256.0	0.8±0.8
Post Changeout	238.1±310.1	0.3±37.1	41.5±40.3	0.5±4.4	0.3±0.0	0.3±0.4	0.1±0.4
Difference	-63%	-100%	+267.0%	No Change	No Change	-62%	-92%

PM2.5 Mass Following Outreach/Education



Challenges

- Sampling equipment malfunctions
- Distance to Kamiah from Lapwai
- Homeowner
  - Learning curve with new stove
  - Paperwork, no shows
  - Selecting 4 new homes mid-study
- Woodstove business & installer
  - Distance (~200 miles away)
  - 2nd round of installations delayed two months due to snow
  - Attitude/not vested in the community

Outcomes/Successes

- Partnerships & intern participation
- Reduced indoor levels
  - $PM_{2.5}$ levels by 52%
  - Levoglucosan by 63%
- Reduced ambient PM2.5 in each community
- 16 tribal homes with EPA certified stoves
  - New stoves "burned off" before change out
  - Old stoves recycled
  - Installation inspection and training
- Outreach and Education

Acknowledgements

- EPA
- University of Montana
- Northwest Indian College, Nez Perce Tribe Distance Learning Centers
- Institute for Tribal Environmental Professionals
- Washington State University Extension Energy Program
- Swinomish Tribe
- Nimiipuu Health
- Nez Perce Tribe Housing Authority
- Nez Perce Tribe Forestry & Fire Division
- Nez Perce Tribe Safety Program

Air Toxics & Health on the Nez Perce Reservation

- Participants
  - Lapwai and Kamiah High Schools
  - NPT Distance Learning Centers, Northwest Indian College
- Sampled for Volatile Organic Compounds (VOCs) indoor/outdoor
- Outreach and Education

VOC Sampling

- Students conducted sampling
- 21 air toxics/EPA Hazardous Air Pollutants
- Sampled for 12 hour period, up to 2 days inside and outside of student homes
- Equipment
  - SKC low-flow pumps
  - Sorbent tubes
- Results
  - Higher concentrations inside
  - Toluene most abundant compound inside and outside in both communities

Outreach and Education

- Presentations
  - University of Montana, Northern Arizona University, NPT Air Quality staff
  - Groups developed research projects
- Articles and info packets
- Projects and Competitions
  - 46th InterMountain Junior Science and Humanities Symposium; Salt Lake City, UT
  - N. Idaho SkillsUSA; Lewiston
  - Air Toxics Symposium; Missoula, MT

Successes & Challenges

- Challenges
  - Communication with teachers
  - VOC sampling
  - Student knowledge base
- Successes
  - Collaboration and partnerships
  - Interaction with university researchers and air quality professionals
  - Gaining hands-on science skills
  - Projects and science competition experience